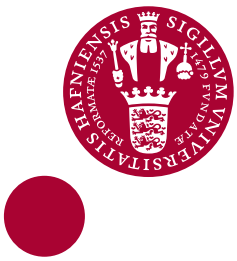

Microstructural and physiological changes of parotid glands after RT for head and neck cancer

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Conclusion
In our prospective cohort, we observed a correlation between acute toxicity and pain, impairment in global health status and general QoL. DVH analysis of oral mucosa and its subsites accurately predicts acute oral mucosa toxicity We were also able to assess the predictive value of clinical parameters for OM. Further studies will be needed to understand clinical relevance, implement daily practice and improve results.

EP-1171 Toxicity profile of locally advanced head and neck cancer patients treated in 30 or 33 fractions RT
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Purpose or Objective
Shortening the overall treatment time without increasing acute reactions is one of the major aims in radiotherapy for locally advanced head and neck cancer (LAHNC). Volumetric modulated arc therapy (VMAT) with Simultaneous Integrated Boost (SIB) showed improvements in the outcome and pattern of toxicity. Aim of this work is to evaluate the toxicity of patients presenting LAHNC, after VMAT-SIB treatment in two fractionation schemes of 30 and 33 fractions.
Material and Methods
Two groups of LCHNC patients were selected: the first, named 33fx, of 98 patients who received 69.96 and 54.45 Gy in SIB in 33 fractions, between April 2009 and November 2015; the second, named 30fx, of 48 patients who received 66.0 and 54.0 Gy in SIB in 30 fractions, between March 2016 and January 2018. All the patients were treated with VMAT-SIB. Target volumes were delineated as CTV adding 1 cm margin to GTV for primary tumour, and according to the international guidelines for nodal regions; a CTV to PTV 5 mm isotropic margin was added for the 33fx group, and 3 mm margin for the 30fx group. Acute toxicity was graded according to CTCAE 3 for skin, salivary, mucosal, dysphagia. Doses from DVHs for each patient were recorded and analysed to determine possible correlations between dose to critical structures (parotids, oral cavity, submandibular glands and constrictor muscles) and toxicity grade.
Results
The dosimetric results showed a significant reduction of the mean doses to the main critical structures when reducing the number of fraction (and the total dose) as well as the CTV to PTV margin. To the parotids, the mean doses were assessed as 28.0±0.7 and 21.8±0.9 Gy for 33fx and 30fx groups, respectively; to the oral cavity they were 46.3±0.9 and 40.9±1.4 Gy; for the constrictor muscles 59.5±0.5 and 52.1±0.9 Gy. Errors are the standard error of the mean.
Acute mucosal toxicity was reported as G1 in 28.6/27.1% (33fx/30fx) of the cases, G2 in 45.9/41.7%, G3 in 8.2/4.2%. Acute dysphagia was recorded as G1 in 22.4/18.8% of the patients in the 33fx/30fx groups, G2 in 25.5/56.3%, and G3 in 7.1/4.2%. Acute salivary toxicity was G1 in 25.5/8.3% of the cases, G2 in 3.1/6.3%, and G3 in 1.0/0.0%. The toxicity profile, in favour of the 30fx group, was significant only for dyspagia ($p<0.01$, test t).
The highly significant difference in the mean doses was not translating to the same high degree of significance in the toxicity profile.
Conclusion
Treatment of LAHNC with 30 fractions radiotherapy and 3 mm of margin seems to be advantageous for the decreased mean doses to the major organs at risk. However, significant toxicity benefit was only demonstrated in the reduction of dysphagia.

EP-1172 Microstructural and physiological changes of parotid glands after RT for head and neck cancer
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Purpose or Objective
Salivary gland hypofunction and xerostomia are prominent complications of conventional radiotherapy (RT) of head and neck cancer (HNC), having considerable negative impact on the patients' quality of life. It is therefore important to assess the salivary gland function in these patients for diagnostic and management purposes.
The aim of this study is to investigate use of diffusion-weighted magnetic resonance imaging (DWI) in the assessment of radiation-induced microstructural changes of the parotid glands in terms of apparent diffusion coefficients values (ADC), compared to physiological changes in terms of measurements of whole salivary flow rates. It is hypothesized that use of combined methods for assessment of parotid gland function, provides further insight into the factors that can predict xerostomia.
Material and Methods
Five patients with HNC who have completed their RT course were assessed in this pilot study. The patients were examined before the first RT fraction (scan 1), after completion of the RT course (scan 2) and one year after completion of the RT course (scan 3). Unstimulated (at rest) and gustatory-stimulated DWI examinations were performed on a 1T MRI system using the DWIBS sequence. Whole-volume region of interest (ROI) method was used for delineation of parotid glands. To suppress perfusion and salivary flow effects high b-values (400, 600 and 800 s/mm^2) were used for ADC calculation using a mono exponential fit. Unstimulated and chewing-stimulated whole saliva were collected and the flow rates were calculated. The degree of xerostomia was evaluated using the Radiation Therapy Oncology Group/European Organization for Research and Treatment of Cancer (RTOG/EORTC) morbidity score. Mean radiation dose (Gy) was registered for both contra- and ipsilateral parotid glands.
Results
Mean ADC (ADCMean) values and salivary flow rates were higher in the stimulated than in the unstimulated state (Figure 1a). An increase in ADCmean from scan 1 to scan 3 both in unstimulated and
gustatory-stimulated state is observed. Further, the unstimulated salivary flow tended to decrease, while chewing-stimulated salivary flow decreased between scan 1 and 2 and increased from scan 2 to scan 3. The ADCMean tended to increase (R^2 = 0.29-0.37), and the salivary flow rates to decrease (R^2 = 0.01-0.12), with increasing mean radiation dose to the glands (Figures 1b). Mean radiation dose to the ipsilateral parotid gland was used for the correlation between saliva flow rates and mean dose. Figure 1c shows a strong correlation between both ADCMean and saliva flow, and the degree of xerostomia (R^2 = 0.66-0.97).

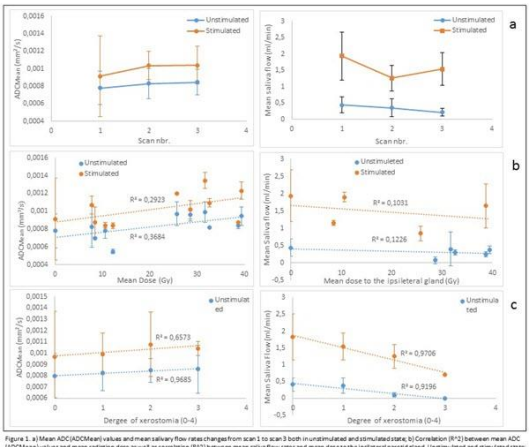

Figure 1. a) Mean ADC (ADCMean) values and mean salivary flow rates changes from scan 1 to scan 3 both in unstimulated and stimulated state; b) Correlation (R^2) between mean ADC (ADCMean) values and mean radiation dose as well as correlation (R^2) between mean saliva flow rates and mean dose to the ipsilateral parotid gland. Unstimulated and stimulated state; c) Correlation (R^2) between mean ADC (ADCMean) values and mean saliva flow rates and the degree of xerostomia. Unstimulated and stimulated state.

Conclusion

The results of this pilot study indicate that the severity of microstructural and physiological changes of the parotid glands after RT is dependent on the mean radiation dose to the glands. It also suggests that DWI and salivary flow measurements can be used for assessing parotid gland function after RT and are associated with degree of xerostomia.

EP-1173 Changes in blood pressure in patients undergoing radiotherapy for head and neck cancers

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Purpose or Objective

Head and neck cancer patients undergoing radiotherapy often complain of fatigue, generalized weakness, light headedness associated with poor nutrition, weight loss, dehydration and vasomotor changes. Various theories are proposed for vasomotor imbalance including neurochemical causes, direct damage to carotid body due to radiation or effect on vasomotor centers in brainstem, effect of chemotherapy. Hence, we studied pattern of blood pressure (BP) changes in head and radiotherapy patients.

Material and Methods

Patients with head and neck cancer, with ECOG 0-1 receiving radiotherapy to head and neck region to a dose of 60-70 Gy over period of 6-7 weeks from December 2016 to Feb 2018. We recorded blood pressure of patients, pre-radiotherapy, weekly during radiotherapy and postradiotherapy at 3-6 monthly interval. Patient symptoms were documented at the same time. We also contoured carotid body region to see document doses.

Results

We analyzed 60 patients of head and neck cancers receiving radiotherapy to head and neck region, 34 patients received concurrent chemotherapy. Thirty-two patients received radiotherapy to bilateral neck. Twenty four out of 60 patients were hypertensive at baseline and were on antihypertensive medications and all patients continued their antihypertensive treatment. Only one patient had history of hypotension in the past. Average weight loss during radiotherapy was 4.1%. We found that there was statistically significant decline in blood pressure from 3rd to 6th week of radiotherapy in both systolic and diastolic blood pressure. Maximum average BP decline till 5th week of radiotherapy from baseline 132 +/-13 / 78+/-7 mm of Hg to 115+/-16 /71+/-9 mm of Hg ($P<0.05$). Compared baseline there was significant decline in blood pressure from 132 +/-13 / 78+/-7 mm of Hg to 121+/-14 / 75+/-7 at 3 to 6 months post radiotherapy ($P<0.05$). Very few patients complained of orthostatic hypotension. Mean doses to carotid body region were 62.45 +/- 4 Gy.

Conclusion

There is a significant decline in BP recorded during in patient undergoing head and neck radiotherapy the effect of which was persistant upto 6 months after radiotherapy. Maximum decline observed upto 5th week of treatment. Hence, it is worthwhile to monitor BP during and after treatment and appropriate intervention to be taken.

EP-1174 Assessment of nausea and dysgeusia in head and neck cancer patients undergoing radiotherapy

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Purpose or Objective

Nausea (N) and dysgeusia (Dg) are common side effects occurring during treatment in HN cancer patients, in case of either exclusive radiotherapy (RT) or combined modality treatment (CMT). Patients' daily living can be significantly affected by N/Dg, with a subsequent worsening of treatment compliance. We prospectively scored nausea and we employed an 18-item CiTAS (chemotherapy (CT)- induced taste alteration scale) questionnaire to evaluate 4 taste dimensions identified through factor analysis: decline in basic taste, discomfort, phantogeusia-parageusia, and general alterations.

Material and Methods

Between 2016 and 2018, 31 patients were treated with Volumetric Modulated Arc Therapy (VMAT) in the HN region within a definitive or adjuvant setting (RT or CMT, 6 or 7 weeks overall treatment time). All patients were given 'Naumix/Naugin' (GAMfarma, Milan, Italy) a spray, containing ginger, anise and vitamin B6 as a prophylactic approach to prevent N/Dg. CiTAS scale was evaluated at baseline (Bs), every week of treatment and during follow-up at 2 adjunctive time-points (1 week and 1 month after RT end).

Results

Patients were aged 64 (range 34–83) with mostly male sex (61.3%). Most represented tumor subsite was oropharynx (25.9%). Most common histology was SCC (77.4%). Patients were mainly staged as T1–T2 disease (58%); N0(19%), N1-3(71%). RT was delivered as definitive (38.7%) or adjuvant (61.3%) treatment with prescribed doses ranging from 54 to 70 Gy. Acute toxicities were generally mild. Grade 1 nausea was reported by 6.5% of patients at Bs, reaching the maximum value during the VI week (38.7%). No patient referred ≥ G2 nausea at Bs, while this endpoint peaked up at III week (13% of patients) with an optimal recovery in most of the patients with antiemetic drugs (*Tab.1*).